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ABSTRACT

Defining prereading skills, discussing their discovery, and determining their value in reading readiness are the primary concerns of this paper. Prereading skills are defined by logical analysis of the reading task and by instructional conventions. From an analysis of initial reading tasks, prerequisite skills are identified. Those skills which are found lacking in a high percentage of children at the time they would encounter prereading instruction are selected for inclusion in a prereading program. Through this procedure at least three specific visual skills and two sound skills have been identified in a number of studies. Direct instruction in the specific skills seems to be required to ensure mastery, as children who are deficient in them generally will not acquire the skills through maturation or general readiness instruction, or discovering them on their own. Furthermore, since skill deficit patterns are not predictable, individualized programs are required for efficient instruction. Further research is necessary to determine the effectiveness of the prereading skills approach to reading readiness. (Author/LL)

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PREREADING SKILLS: THEORETICAL FOUNDATIONS AND PRACTICAL APPLICATIONS

by

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Report from the Prereading
Skills Program

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ABSTRACT

Of the various approaches to reading readiness which have been introduced into the kindergartens over the past 50 years, the one that receives the most emphasis today is the prereading skills approach. Although not a unified or codified instructional method, the approach centers on direct instruction in those skills which relate directly to the reading process or to learning to read. Prereading skills are defined by logical analysis of the reading task and by instructional conventions. From an analysis of initial reading tasks, prerequisite skills are identified. Then those skills which are found lacking in a high percentage of children at the time they would encounter prereading instruction are selected for inclusion in a prereading program. By this procedure at least three specific visual skills and at least two sound skills have been identified by a number of studies. Conspicuously missing from this list, however, are letter-name knowledge, fine-motor performance, and visual discrimination of objects and shapes--all skills which are assessed by popular reading readiness tests.

Children who enter kindergarten without all of the visual and sound prereading skills generally will not acquire the missing skills through maturation, general readiness instruction, or by discovering them on their own. Direct instruction in the specific skills seems to be required to ensure mastery. Furthermore, since skill deficit patterns are not predictable, individualized programs are required for efficient instruction.

Based upon the prereading skills isolated by a four-year research program, and instructional constraints resulting from the IGE model, a prereading skills program (PRS) was developed during the period 1970-1974. After an initial tryout of materials and activities in three kindergartens, a full-year program was developed and pilot tested in 14 classrooms. Using a variety of monitoring schemes, information was obtained for a major revision of the program, which was done prior to the 1972-73 school year. Following a field test that year, plans were made for further revisions and for commercial production.

I

INTRODUCTION

THE EVOLUTION OF READING READINESS

Several thousand years ago, reading was considered to be an uncomplicated task that centered primarily upon letters and their various combinations. Consequently, neither reading readiness nor prereading skills were considered issues among the Greeks, the Romans, the Minoans, the Etruscans, or any of the other ancient populations that exhibited the slightest traces of literacy. Plato, who recommended that instruction in reading and writing commence only at the age of ten, quotes Socrates as saying:

> Just as in learning to read, I said, we were satisfied when we knew the letters of the alphabet, which are very few, in all their recurring sizes and combinations; not slighting them as unimportant whether they occupy a space large or small, but everywhere eager to make them out; and not thinking ourselves perfect in the art of reading until we recognize them wherever they are found [Plato, The Republic, III, 402A].

Huey, writing more than 1,200 years after the death of Plato, was among the first to convince educators that learning to read required more than a knowledge of the letters. Nevertheless, nearly twenty years passed before concern for the proper preparation of children for reading instruction was shown. "Reading readiness," a phrase that was first given widespread exposure in the 1925 Yearbook of the National Society for the Study of Education, gave purpose to a kindergarten movement whose rationale at that time was neither understood nor accepted by school administrators (Weber, 1969, pp. 198f). But by the late 1920's teaching children to read was seen as a serious and complex business, and the enlistment of the kindergarten for readiness or even formal reading instruction was readily welcomed.

Reading readiness developed first as an attempt, as recommended by Thorndike, to produce the appropriate predisposition for reading and to purge those conditions that might interfere with this "proper mental set." This concept was tempered by the maturational concepts of the 1930's, particularly those of Gesell, which emphasized the necessity for certain structural developments to occur before functional changes could take place. The ready acceptance of maturational prerequisites was especially reflected in the over-generalization of a study by Morphett and Washburne (1931). This study concluded, on the basis of a single instructional technique and a sample of upper-middle class suburban children, that:

> By postponing the teaching of reading until children reach a mental level of six and a half years [on the Detroit First-Grade Intelligence Test], teachers can greatly decrease the chances of failure and discouragement and can correspondingly increase their efficiency [p. 503].

In spite of overwhelming evidence to the contrary, this belief lingers on in the reading rituals of some school systems, and was probably not unknown to the late Paul Goodman, who claimed that if left on their own, children would mature into reading by the age of 9 or 10 just as they grow into speaking at the age of 2 or 3.

Two other readiness developments of the 1930's which are more important for our current concerns were the increased concern for experiential readiness and the introduction of skill-oriented, prereading activities. These developments eventually merged into the composite programs which were used during the 1950's and 1960's by most readiness-oriented kindergartens.

In the current decade, reading readiness has noticeably shifted away from experiential readiness and toward an emphasis of prereading skills; that is, toward those skills which are believed to relate most directly to the specific processes involved in initial reading instruction. In this regard, it is difficult to argue with the editor of the New Encyclopedia of Child Care and Guidance,

> Reading readiness has come to mean something different than it did in the past [Gruenberg, 1958, p. 452].

The prereading skill approach is not, however, the only available approach to reading readiness, nor is it a single approach within itself. Both the selection of prereading skills and the instructional procedures chosen for them vary widely from program to program, but the general approach is sufficiently widespread to merit careful inspection, especially of its theoretical foundations and its relationship to instruction.

Since prereading skills programs are relatively new and few formal attempts have been made to explain or justify them, much of the analysis presented here will be drawn from unpublished work, particularly from research and development centers and regional laboratories, and in particular, from the Wisconsin Research and Development Center for Cognitive Learning. My primary goal is to present for inspection an approach to reading readiness which I feel is both interesting and productive, but has yet to have its most basic assumptions subjected to thorough and critical analysis.

At the same time, I would like to discuss the complexities and pitfalls that result from attempting to relate the theoretical and experimental conclusions presented here to curriculum design, drawing, in particular, on an eight-year project which has struggled, with some success, to produce an experimentally based prereading skills program.

TERMINOLOGY

In spite of the bad name which reading readiness has acquired from certain ill-conceived and unconscionable practices, it is still an adequate general term for activities which are done as a prerequisite to formal reading instruction. In other words, "reading readiness" is defined by intent, and includes any activities that are intended to prepare children for reading. Whether these activities engage the ears, eyes, toes, or cerebral cortex of the child, and whether they involve letters, numbers, geometric forms, or pictures is immaterial. Just as rational and irrational numbers are still numbers, and rational and irrational psychologists still psychologists, so are rational and irrational readiness programs still readiness programs.

Prereading skills are defined more qualitatively; they are those skills that relate most closely to either the reading process or to the procedures that are employed in teaching reading. In this sense, teaching prereading skills is one approach to reading readiness. Other approaches might concentrate on motor behavior, socialization, or oral language, for example, but none of these qualifies as a prereading skill. What prereading skills are, how they are discovered, and what value they have in reading readiness are the primary concerns of the following sections of this paper.

II

PREREADING AND READING

Prereading skills are defined by logical analysis of the reading task and by instructional conventions (which, admittedly, are somewhat arbitrary). If we select those tasks that characterize the first year or so of reading instruction and then ask which skills are prerequisites to the tasks that have been selected, the result will be a list of prereading skills. Obviously, not everyone agrees on what should occur in the first year or so of reading instruction and not everyone agrees on what the prerequisites are for any complex reading task, but this simply yields competing skill sets, not competing approaches. If, for example, we select sight-word recognition as one initial reading task, then certain prerequisite skills are immediately identifiable, including visual matching of letters and visual matching of letter strings. We might extend this analysis to more primitive levels and thereby include the ability to direct and focus the eyes, concepts of same and different for visual forms, the ability to attend to a visual pattern, etc. Where this analysis is terminated must be based on a knowledge of the age level for which the skills are being defined; that is, upon observation of those skills that have already been mastered by the target population. However, at the point where the skills defined are so basic as to be prerequisites for almost all learning, we have clearly gone beyond prereading.

In other words, we arrive at prereading skills by identifying a complete set of initial reading tasks and then defining all of the prerequisite skills for this set of tasks. Then, for a given population of prereaders, those skills which all or almost all members of the population have mastered are eliminated. Those that remain are labeled "prereading skills" for purposes of instruction.

By this process we are forced to the conclusion that the intermodal integration task investigated by Birch and Belmont (1964) is not a prereading task because it is not a prerequisite for any known instructional task or reading skill. At the same time we can eliminate most of the Frostig motor control tasks (Frostig, 1963) because they have already been mastered by almost all children at the level at which they are typically introduced. The same considerations lead to abandoning phonemic discrimination tasks for almost all native speakers of English, primarily because careful testing reveals that almost all children enter kindergarten with well-developed discrimination ability. Claims to the contrary are based on testing paradigms that are generally not valid for one-pass testing of young children (Rudegeair & Kamil, 1970).

One might become highly skeptical of the procedure advocated here, due to the apparent diversity in instructional methods. However, the real differences in classroom tasks among the various so-called teaching

methods--phonics, whole-word, linguistic, and so on--as I have argued elsewhere (Venezky, 1974), are more apparent than real. All rational approaches to reading instruction include both sight-word learning and letter-sound learning, with its concomitant reliance on sound blending. Methods differ in the sequencing and presentation of these tasks, but not on much else. The language-experience approach might appear as an exception, but many classrooms which use language experience also use some other approach, such as phonics, to introduce basic decoding skills. Even where no overt instruction in decoding is given, our task in defining prerequisite skills remains the same: to define, in fact, which reading skills were acquired and then to determine prerequisites for them.

Finally, it is assumed that eventually an empirical test will be made of the relationship between the skills that have been chosen and reading. Further discussion of this will be presented in a later section of this paper which discusses the problems of developing and evaluating prereading instruction.

IDENTIFICATION OF SPECIFIC SKILLS

The two most important tasks in initial reading are sight-word recognition and decoding. These form the basis for reading connected text and for comprehension, and as such are the objects of our search for prerequisite skills.

Sight-word recognition involves visual discrimination of letter strings, association and retention of labels for these strings, and the ability to retrieve and articulate the labels when shown the appropriate stimuli. That children at the kindergarten level can generate novel sentences from previously learned words, that is, can communicate via oral language, is an indication that words can be stored and retrieved.[1]

Furthermore, nearly 75 years of paired-associate learning studies have shown that five-year olds can acquire verbal responses to visual stimuli, although the limitations on this capability have barely been explored. Kindergarten norms for the Peabody Picture Vocabulary Test, for example, clearly demonstrate that children can retain and produce verbal labels and associate them with visual stimuli.

This leaves the visual discrimination component of word recognition as a candidate for prereading skill definition. If we knew with any certainty the processes through which adults recognize words, we could identify quite rapidly the prerequisite abilities for this task. However, there is probably no area of reading so torn by controversy as word recognition (Smith & Spoehr, 1974; Gibson & Levin, in press). The more tenable models for recognition center on unmediated recognition of letters or letter groups, with some degree of parallel processing of subunits. However, even with an inchoate model for the recognition process, a number of prerequisite skills can be identified, especially from studies of recognition errors. Letter recognition is

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[1] For the remainder of this paper I will assume a kindergarten level target population.

one candidate, but for kindergarten level children the only consistent problem found in matching single letters is in attending to letter orientation, particularly the lower case pairs p-q, b-d, n-u, and to a lesser degree, m-w, and s-z (Calfee, Chapman, & Venezky, 1972). A second visual matching problem results from failure to attend to the order of letters in words, that is, the classical was-saw, no-on confusions. Hill (1936) identified order reversals as a major source of word-matching errors made by children just prior to formal reading instruction, and also after 10 to 14 weeks of reading instruction. Similar results are reported by Calfee, Chapman, and Venezky (1972) and Robinson and Higgins (1967).

The only other failure reported consistently in word-matching studies is the failure to attend to the entire visual array; that is, in basing a judgment upon an insufficient number of visual features. Hill (1936) reported from her studies of word-matching errors that training "apparently tended to pull the attention of children more and more to the beginning of the word [p. 497]." Analyses of word substitution errors in oral reading show the identical effect (Bennett, 1942; Weber, 1970).

The tendency in some children to base word identity primarily upon initial letters often leads to successful word recognition strategies in the early stages of reading when vocabulary is severely limited. For example, we have noticed from the primary-level vocabulary list published by Durr (1973), that more than 75 percent of the words occurring in children's readers in the first through third grades can be descriminated on the basis of their initial two letters plus length. At some point, however, an initial-letter strategy collapses, with disastrous effects for the child.

These three skills, (1) attending to letter orientation; (2) attending to letter order; and (3) attending to word detail, comprise the most important skills related to word recognition. They are not independent, as shown by Chapman (1971), but they are sufficiently distinct (correlations range from .39 [detail and orientation] to .67 [detail and order]) to merit separate attention.

Different prereading skills result from a task analysis of decoding, primarily because of the acoustical component. At a minimum, decoding involves the following subtasks: (1) letter differentiation; (2) association of a sound with a letter; and (3) blending of sounds to produce a word. However, observation of children attempting to decode words reveals that several other processes can also operate. Typically, the beginning reader sounds out a word to himself and then decides whether it is acceptable. If so, he pronounces it aloud; if not, he usually alters a single sound and repeats the testing procedure. But to alter a single sound in this context implies an ability to attend to individual speech sounds within the continuous speech stream--an ability that many children have difficulty developing. It is further observed that the acquisition of letter-sound generalizations presupposes the ability to recognize similarities and differences between sounds in different words. For example, for a second grade child to give a long pronunciation to the a in nabe and a short pronunciation to this same letter in nab requires that he notice the similarity of the sounds for a in words like cab, tab, and lab and that they differ from the a sound in race, cape, and lake. The alternative hypothesis, that the child generalizes

from a verbalization of a rule, is inconsistent with experimental data reported by Venezky and Johnson (1973) for English letter-sound patterns.

In summary, the skills that may be adduced from an analysis of decoding are (1) letter differentiation; (2) association of a sound with a symbol (letter); (3) blending; (4) identification of a sound within a word; and (5) sound matching within words. Of these skills, letter differentiation has already been discussed and most children have already mastered part of the ability to associate sounds with letters prior to their entry into kindergarten. Marsh and Sherman (1971) have demonstrated that contrary to the dicta of Bloomfield (1942) and Fries (1963), kindergarten children have little difficulty in pronouncing individual speech sounds in isolation.[2] Venezky, Chapman, Seegal, Kamm, and Leslie (1971) demonstrated that when an individual speech sound response is paired with a picture of an object that ostensibly makes the sound involved (e.g., a snake that says /s/), learning by kindergarteners for series of such correspondences is extremely rapid and retention is exceedingly high. However, this is precisely what is expected from the observation that preschoolers have little difficulty in acquiring single speech sound responses in meaningful contexts, as for example, in learning the sounds that certain animals make.

The question of whether to include symbol-sound learning as a prereading skill is moot. Certainly it should be included in preparation for reading instruction which is heavily weighted towards letter-sound associations, perhaps not otherwise. The remaining three skills listed previously qualify as prereading skills, although the fourth and fifth skills might profitably be collapsed into a single sound-matching skill.

This analysis completes the identification of prereading skills which are the immediate prerequisites to initial reading. Conspicuously missing are, among others, letter-name knowledge, fine-motor performance, and visual discrimination of objects and shapes--all skills that are prominently featured in popular readiness programs and are assessed on standardized reading-readiness tests (e.g., Metropolitan, Clymer-Barrett). There is strong evidence which shows that training in these skills yields little gain in reading scores. Gates, Bond, and Russell (1939) found that at the primary level the correlation of geometric form perception with reading achievement was significantly lower than the correlation of word perception with reading. Paradis (1974) reports a series of studies which concluded that reading achievement at the primary level was little affected by discrimination training with nonverbal stimuli, and Muehl (1960) found that kindergarten children who received pretraining in visual discrimination of words performed better in a "reading" task involving these same words than children who received pretraining on different words or on geometric forms.

Letter naming is central to the popular conception of reading instruction, but a logical justification for this role has never been made. According to Durrell (1956), letter names are effective mediators for the letter sounds--a position which a cursory glance at the alphabet renders indefensible. Three letters--h, w, y--have names which do not contain their sounds and seven others--a, e, i, o, u, c, g--do not contain the sound which is typically taught first in reading

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[2]The percentage errors for consonants was 13.29, and for vowels 5.96. However, the corresponding figures for phonemes in words were significantly lower.

programs. Of the remaining sixteen, nine are composed of a consonant-vowel structure while seven are vowel-consonant (e.g., f, l, m, n). This means that 40 percent of the letter names are not useable as sound mediators and the remaining 60 percent must be differentiated according to where the mediated sound occurs. There are, as most reading teachers know, more effective approaches to teaching letter sounds. It should also be pointed out that there is no evidence which shows that instruction in letter naming improves reading achievement. (In all fairness to Sesame Street and other programs which emphasize letter naming, it should be noted that there is some redeeming value to letter names. They are convenient labels for talking about the letters, and their vocal declaration by the child, especially in an approximation of the approved ordering, is often sufficient proof to parents of the efficacy and good intentions of the school system.)

Fine-motor training is in the same position as letter naming; it possesses neither a strong logical connection to reading nor an experimental justification. On the contrary, attempts to affect initial reading skills through fine-motor training have failed, both with alphabetic materials (Pryzwansky, 1972) and nonalphabetic materials (Cohen, 1967; Rosen, 1966).

That some of these skills (or ones rejected earlier such as ocular-motor control) show high correlations with reading achievement is not a sufficient condition for their classification as prereading skills. The cost of the automobile which a child's parents drives also correlates highly with reading achievement, but it would be absurd to claim that giving expensive cars to parents will improve their children's reading scores. The identification of prereading skills is based upon logical analysis and upon the effect which skill instruction has on later reading achievement. This measure must be applied with caution, however, in that what is taught is often more than a single skill, no matter how carefully designed the instructional materials might be.

THE NECESSITY FOR PREREADING INSTRUCTION

One response to the preceding skill derivation discussion could be to accept the relationship between the prereading skills just defined and reading, but to deny that instruction in them, especially at the kindergarten level, can have a major effect. Strict maturational theories (e.g., Benda, 1954) hold that development is primarily biological and cannot be interferred with through instruction. Another response might be to claim that all of the skills just named can be derived from universally innate potentialities which can be developed only through guided discovery. Neither argument can or should be totally refuted. There is evidence for both maturational and higher level cognitive factors in learning to read, but the more important evidence related to prereading and initial reading points away from these variables.

In a study which my colleagues and I recently completed (Venezky, 1974) 94 kindergarten children were tested at the beginning and end of the school year on four prereading skills: (1) attending to letter order; (2) attending to letter orientation; (3) attending to

word detail; and (4) sound matching. Sixty-eight of these children received general readiness activities. When these children entered kindergarten, the number, across the two groups, who showed mastery of the skills varied from 7.5 percent (sound matching) to 21.5 percent (orientation). These entry data demonstrate that, within the limitations of the instruments and subject population used, these particular skills are generally lacking in children when they enter kindergarten.

By the end of the school year, 77.5 percent of the skill failures in the skill-program group had changed to skill mastery. For the control group, only 38.1 percent of the failures had been changed to mastery. The significance of these figures is not suggested in the efficacy of the skill-oriented instruction, but in the low level of mastery in the control group; that is, in the lack of any appreciable effect from maturation or general readiness instruction.

The argument advanced here is that initial reading requires a low cognitive load when compared to advanced reading for which comprehension is a major factor, or to logical-mathematical abilities, and that prereading skills are basically attentional-informational. Data in support of this position can be found in studies of IQ and reading (e.g., Gates, 1921) which show that the relationship between IQ and reading increases with increased reading level. Furthermore, teachers will usually include a child with an IQ of 80 to 85 in a regular initial reading class, but will not include this same child in a regular class at a higher grade level.

The second type of support for this position is found in attempts to induce children to discover prereading or early reading skills. Silberman (1964), Gibson, Farber, and Shipela (1967), and Jeffreys and Samuels (1967) report unsuccessful results with five- and six-year-old children in inducing discovery of specific visual-acoustical relationships, but were considerably more successful when the relationships were made explicit. (Silverman [1964] and Jeffreys and Samuels [1967] tested transfer of letter-sound associations; Gibson, Farber, and Shipela [1967] were concerned with letter order as a variable in the abstraction of spelling patterns.) Similarly, Caldwell and Hall (1969) and Hall and Caldwell (1970) found that attention alone was not sufficient for teaching young children to discriminate between rotations and reversals of geometric forms. The essential element in these studies was making explicit the appropriate concept of "same" and "different."

Similar conclusions can be drawn from word recognition studies by Otto and Pizillo (1970) and McCutcheon and McDowell (1969). In summarizing these studies, Koehler (1971, p. 2) reports that kindergarten and first-grade children "will attend to and encode only the cues required to minimally distinguish words during word acquisition." In other words, the strategies adopted for word recognition derive directly from the contrastiveness of the words which the child is initially trained on--a result which, in part, accounts for the initial letter strategy mentioned earlier.

Another approach to evaluating the maturational and innate potential theories is to inspect the patterns of prereading skills deficits. If prereading skills were simply different surface manifestations of a single underlying factor, we would tend to find an all-or-nothing distribution of skill deficits; but data reported by Chapman (1971) for mastery of five prereading skills by 138 kindergarteners show a wide dispersion of mastery/non-mastery patterns.

Finally, a logical analysis of the prereading skills isolated in the previous section shows that many of them are based upon arbitrary relationships. Attending to letter order and letter orientation are skills that are unique to reading. The objects in the child's environment prior to his first encounter with the alphabet retain their identity under order and orientation reversal. The letters of the alphabet (and numbers) are the first objects for which the child must attend to orientation in labeling, and words (and numbers) are the first objects for which order is significant. There is no reason therefore, to expect the child to induce these conclusions from his encounters with the environment.

Similar arguments, although perhaps not as strong, can be made for the sound skills, especially for sound matching where certain features such as intensity and duration must be ignored while others such as voicing must be discerned. In short, the weight of the evidence points in the direction of direct instruction.

VALIDATION

Whatever may be the logical basis for our selection of prereading skills, and eventually of the methods selected for teaching them, we are still responsible for an empirical validation of our choices. Guidelines can be developed for evaluating instructional methods, based on the mastery levels assumed for the skills involved, but ascertaining the necessity of each skill for learning to read is a far more complex matter.

First, since no one skill listed above is a *sine qua non* for learning to read, gross comparisons of skill deficits to later reading achievement, although perhaps suggestive of trends, are not accurate measures of skill necessity. Second, a skill which is lacking just prior to formal reading instruction might be acquired as a result of reading instruction itself. For example, a child who does not attend to orientation in letter identification might learn to do so in learning to read through the instruction he receives on such sight word pairs as *bad-dad* and *rib-rid*. The need for instruction in prereading skills is not based on an all-or-none concept of learning; instead it is based on efficiency: the child who comes to beginning reading instruction with mastery of all prereading skills should have considerably less difficulty in learning to read than the child who does not. Furthermore, the difficulties which we expect a child to have in learning to read should be predictable from his prereading skill deficits.

This assertion is the basis for empirical validation of prereading skills, and its implication is that while the child is learning to read we search for particular types of errors (or the absence there of) according to the prereading skills which the child lacked upon entry to initial reading instruction. How exactly to do this is not immediately evident, however, since a teacher who finds a child struggling to acquire a particular skill may give him sufficient personal help to overcome earlier deficits, and thereby alter his error patterns. Nevertheless, the direction which validation must take is clear; only the procedure needs to be resolved.

SUMMARY

In summary, the prereading skills approach, which emphasizes direct explicit instruction in skills directly tied to learning to read, is based first upon a logical analysis of the initial reading task; second, upon experimental data derived from different attempts to teach particular prereading skills; and, in particular, from data which show that many children do not acquire prereading skills without explicit instruction in them. Skills which are logical prerequisites for initial reading skills are candidates for prereading instruction, but they are not selected until it is shown that a sufficient number of prereaders lack them to justify their inclusion in an instructional program. It should be noticed that the processes just mentioned make minimal use of statistical correlation and of instruction per se for the identification of specific skills. Predictive studies, which are of questionable value for any classroom application, may be suggestive of skills for further analysis, but by themselves are often incomplete and misleading, due to their penchant for numerical potency over logical relationships. As Edmund Gordon (1965) noted, correlational studies offer no guidelines for instruction, and may lead to spurious statistical bases for popular mythology. Similarly, to champion a particular skill because instruction in it produces an increase in some reading ability, such as, for example, word recognition, is also unacceptable, unless the process of instruction is so carefully decomposed so as to show precisely what was taught. Instruction can be a valuable check, however, on skills selected by other means.

The conclusions reached here contrast noticeably with the preschool models derived from the work of Piaget, and potentially with those of the language remediation school. Furth and Wach (1974) for example, who represent one of many differing attempts to translate Piaget's generalizations into instruction, insist that children should discover auditory skills themselves.

> Group instructors should allow the children's auditory thinking skills to develop naturally in response to games; they should never give the "right" answer--when the games involve a nonsense language, the children are expected to discover the code themselves [174f].

While the interpretations of "discovery" might vary, the implication of this statement is directly opposed to the results of the studies cited earlier which failed to induce mastery of related skills through discovery techniques. To my knowledge, no experimental evidence has been produced which justifies the discovery approach to prereading skills at the kindergarten level.

Language remediation approaches to reading readiness (Stern, 1968; Bereiter & Engelmann, 1966) are compatible with the approach discussed here to the extent that language deficits can be shown to interfere with the acquisition of prereading skills and therefore define prerequisites to the prereading skills themselves. But some language skills included in language remediation programs, including especially phonemic discrimination, have not been shown by valid experimental means to be lacking in the subject populations for which these programs were designed.

There is an obvious limitation to the prereading skill approach as a total model for child development; but it does not pretend to be one. Instead, it concentrates only on those skills which relate directly to learning to read, and leaves such skills as motor development and socialization to other programs and other approaches.

There is a more serious limitation, however, to the evidence we have in favor of the prereading skill approach, caused by a dependence upon short-term studies and paradigms which produce immediately observable effects. Piaget's concern, in contrast, is with continual, long-term development and it may not receive fair evaluation when assessed on the basis of its ability to show quick results. To resolve this issue, we will need to wait until some of the more recently developed programs for teaching prereading skills have been in use long enough to assess their contribution to reading instruction.

III

DESIGN OF PREREADING SKILLS INSTRUCTION

To propose that certain skills are necessary prerequisites for learning to read, and to establish a need for instruction in such skills is for the most part a matter of composition and salesmanship. Some of the supporting data for these notions have been available for the last decade, and the ideas themselves have been around since the 1930's. Gates, Bond, and Russell were headed in this direction when they wrote: "The most useful reading readiness tests are tests of ability clearly involved in learning to read [1939, p. 29]." Nevertheless, a proper respect for the complexity of child development, of learning, of instruction, and of the reading task itself leads us to require sufficiently more evidence for the efficacy of prereading skills instruction than is presented or implied in this paper so far. In particular, instructional procedures need to be designed, tested, and shown to produce better results than other approaches to reading readiness. The first part of this requirement is the concern of this section; some of the problems encountered in implementing the second part--that is, program evaluation--are discussed in the final section. In particular, this section will present the results of almost five years of experiences in developing and testing a kindergarten level prereading skills program. The purpose in presenting this endeavor is not, however, to justify or promote the program itself, but to exemplify the enormous chasm between idea and object and between research and development.

BACKGROUND

The program described here, called PRS for short,[3] was developed at the Wisconsin Research and Development Center for Cognitive Learning between 1970 and 1974, and was based initially on prereading and early reading studies done by Robert Calfee, Robin Chapman, and myself (see, for example, Calfee, Chapman, & Venezky 1972, and Venezky & Chapman 1970). Our initial goals were to develop instructional procedures based on the IGE model (Klausmeier, in press) for a limited group of prereading skills. Over the development and testing period, however, several other goals or constraints were adopted, based upon classroom experiences. Most of these required decisions which for the most part could not be drawn from the prereading approach or from experimental data. These constraints were:

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[3] The lead authors of PRS are Susan Pittelman and Marga Kamm. Ron Leslie was responsible for the diagnostic tests contained in the program while Jane Seegal and Susan Chicone were contributing authors. The present writer was program director.

1. Attention to individual needs. As specified by the IGE model, children should receive instruction only where they need it. This implies that the teacher be provided with diagnostic techniques for determining skill needs, and with a scheduling and management scheme that allows the teacher to plan and implement instruction according to individual needs.
2. Variation in instruction grouping. The traditional classroom uses whole-class grouping for most instruction; programmed instruction relies almost exclusively upon individual instruction. As a steady diet neither extreme is healthy for children or efficient for individualization. (It should be noted, also, that programmed instruction, although doled out in individual portions, is not necessarily individualized instruction. In general, all children, regardless of their needs, follow the main course of the program. Branching for further help on particular questions is in no way equivalent to tailoring instruction to specific skill deficits.)
   For preparation for reading instruction, a variety of instructional groupings are required, ranging from whole class (or unit) to individual. Emphasis on small groups, however, seems appropriate for the kindergarten level where socialization remains a major goal.
3. Compatibility with a kindergarten philosophy. The kindergarten philosophy which we find most agreeable is one which emphasizes development of the whole child within an open and accommodating environment. We do not view the kindergarten as an appropriate level for hard-core instruction in academic matters, at least for most children. It is important, therefore, that instruction in prereading skills not use a major portion of the kindergarten day, and that instruction be based on songs, games, stories, and other kindergarten-level activities which allow a learning-by-doing approach. Where possible, the children should be led to discover relationships on their own. However, this approach must be tempered according to the arbitrariness and complexity of the task (as discussed above) and by the capabilities and learning styles of the child.
4. Development of a positive attitude towards reading. As a complement to our skill-mastery goals, we also wanted to create a positive attitude for learning to read. Learning the prereading skills, therefore, has to be enjoyable for the children; in addition they should experience success as often as possible so that they feel that they can learn to read.[4] Associated with this goal is the desire to provide continual exposure to the vocabulary, processes, and paraphernalia of reading instruction--including worksheets, tests, letters, and words.

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[4]There is an obvious danger to this as pointed out by Entwisle (1974). The child who receives continual positive reinforcement even though he or she is operating far below the class average, must eventually be confronted with the fact that he or she has failed.

5. Minimal teacher preparation. Individualizing instruction, especially for a teacher who has 35 children in a class and no aide, is difficult. To require this teacher to participate in extensive preservice/inservice training and to do extensive preparation for each lesson would doom any program to failure. Therefore, the program had to be designed for use without an inservice session and with at most a half-day preservice session. It had to contain all of the materials required for instruction: schedules, teacher guides, and all instructional materials, in addition to the diagnostic instruments and management system.

SELECTION OF SKILLS

The selection of skills for instruction was based on both the importance which we attributed to each skill and the instructional procedures which we adopted. In the program itself, five skills are emphasized and a diagnostic test (criterion referenced) is provided for each. These skills are (1) attending to letter order; (2) attending to letter orientation; (3) attending to word detail; (4) sound matching; and (5) sound blending. However, in teaching these skills several other skills--especially acoustical ones--are taught. For example, sound-matching activities are based on picture-sound associations which are taught in groups of four through songs, games, and stories. The first set of these contain pictures of an angry cat (/f/)[5], a surprised boy (/o/), a snake (/s/), and a child eating cake (/m/). These are learned very rapidly by children of all SES levels and retained with minimal reinforcement through at least the school year. Once learned, they become a mechanism not only for talking about sounds ("Listen for the sound that the mad cat makes."), but for self-corrective small-group and individual games. In sorting games for initial sounds, for example, children will sort pictures of common objects into piles according to their initial sounds. The piles for each are marked by the appropriate sound picture, and in addition the sound picture for each object's beginning sound is printed on the reverse side of the object's picture. Once the cards are sorted, they are turned over and checked. Similarly, letter-sound associations are introduced as a basis for blending. They are taught first in association with their corresponding sound pictures, but the sound-pictures are quickly faded out. Other skills that are taught include rhyming (which is used to introduce sound matching in word-final position) and same-different as an introduction to visual matching skills.

INSTRUCTIONAL PROCEDURES

The design of instructional procedures was one of the most difficult developmental activities, and the one which revealed most clearly the

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[5] International Phonetic Alphabet (IPA) symbols are used here.

inadequacy of present-day experimental procedures as aids to instructional design. The most common paradigm for exploring children's skill capabilities is the training-transfer design. Typically, children are introduced to a task through demonstration and then, using one of several common paradigms, they are given a number of training trials. Those children who reach criterion on the training task (and occasionally, even those who do not) are then given a test which generally utilizes the same paradigm employed for training, but uses new materials. From the results, far-reaching conclusions are usually drawn concerning the age levels at which children develop some particular skill that is assumed to underlie the experimental materials and procedures.

Exactly what can be concluded from such studies beyond the exact materials, paradigms, and subjects involved is not clear. One conclusion which should not be made in such a situation is that the skills involved cannot be taught to children who are the same age as those children who failed to master the task. A good part of present-day child development research is being spent in disproving the limitations on learning which have been incorrectly assumed from such studies. A major part of our design efforts, especially for sound skills, was spent in demonstrating that certain skills could, with sufficient effort, be taught to kindergarten children (see Venezky et al., 1971).

A second and perhaps more serious limitation to the experimental work of the past two decades on prereading skills is its lack of concern for sustained learning in a classroom setting. Most of what we know about the acquisition of prereading skills derives from brief training and testing paradigms in which an experimenter interacts with one child at a time. Yet the design decisions which must be made in the development of an individualized program relate to sustained learning which takes place over the entire school year and in a variety of instructional groupings--the least frequent of which is the one teacher/one child situation. Questions of optimal group sizes, amounts of repetition and reinforcement, sequencing of instructional activities, and a multitude of other design problems cannot be resolved on the basis of the last 90 years of psychological and educational research and probably will not be resolvable on the basis of the next decade's work unless radical changes are made in experimental methodology.

In the design of the program discussed here, emphasis was placed on drawing the child's attention to the features which were important for a particular task, and in giving him strategies for carrying out the more complicated procedures. For order and orientation, for example, the notion of direction is introduced, using an arrow which children learn to manipulate and follow in a variety of activities. The arrow then becomes a prop for determining whether or not two letters (e.g., b-b or b-d) point in the same direction or if two letter sequences (e.g., ab-ab or ab-ba) have the same order. Activities are sequenced from easy to difficult, and wherever possible, from concrete to abstract. For each skill, activities were designed to

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incorporate a variety of different paradigms. As an example of the strategies and materials used for instruction, an outline is given below for teaching children to attend to letter order.

A. Visual Preliminaries. Prior to introducing letter order, 12 regular lessons[6] are devoted to the basic concepts, materials, and strategies used to teach the three visual skills. These include judging (same-different and set matching), checking (using a plastic overlay to determine if a correct match has been made), attending (using a memory game), marking (worksheets), and direction. For children who have difficulties with preliminaries, three optional extra help days are indicated in the schedule.

B. Order I and II. Instruction in letter order is divided into two segments which are separated by letter orientation and word detail activities. Children who do exceptionally well on the visual preliminary worksheets should be pretested on order. Testing for those who do order activities can take place at the end of either segment. Children who show mastery at the end of Segment I do not in general do the activities in Segment II. Order I contains 15 lessons, and Order II, 12 lessons. The combined activities include five regular small-group games, two extra-help small-group games, two take-home games, eight worksheets, and eleven whole-class activities. These activities are sequenced in such a way as to allow different small-group games to be played during the same lesson. During such sessions the teacher and aide, if available, go from group to group informally assessing each child. These assessments are indicated on each child's edge-notch card and are used for deciding what a child should do in subsequent lessons. The small-group games are played in groups of either two or four and include: (1) two versions of lotto (with two-letter and three-letter items); (2) pick-a-pair (finding a match for two letters on a card); (3) dominoes[7] (two-letter items); and (4) word twins (a same-different card game, using cards which have two three-letter strings each.) In all of these games, the main distractors are order reversals. The take-home games are lotto-like games which are constructed and used in class, and then taken home with program supplied letters which explains the games to parents.

The practice sheets contain matching against a sample items, with either two or three alternatives, and either two or three letters per alternative. (But length is constant within an item.

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[6] A lesson is usually a single, 20-minute session. Typically, three to five lessons are given each week, alternating visual and sound activities.

[7] Dominoes is also played by a single child.

C. Review. Sound and visual skills are taught in parallel, using separate schedules and separate lessons. Once the visual skills are completed, however, the two skill areas are combined to teach letter-sound correspondences and blending. Review lessons for visual skills are interspersed throughout the combined schedule, and include for the most part worksheets which utilize matching formats found in reading readiness tests and introductory reading materials.

The instructional procedures for order and for the other skills taught in the program evolved through almost five years of tryouts, pilot tests. and field tests. In the research phase of this project, which covered four years, diagnostic instruments were developed for assessing particular skills, and some experience was gained in teaching certain less complicated skills, such as relating sounds to pictures. Beginning in the 1970-71 school year, instructional tasks were designed and tried out in three cooperating kindergarten classes by our experimenters and by the teachers. After extensive feedback from the teachers--and the hiring of one as a full-time staff member--a complete, year-long program was designed and produced in the summer of 1971 and pilot tested in 14 classrooms during the 1971-72 school year.

Pilot-test teachers answered questionnaires, were observed frequently in the classroom, and participated in several feedback sessions during and after the school year.

On the basis of the 1971-72 data, another major revision was made during the 1972 summer, and field tested in 22 classrooms in Illinois, Wisconsin, and Minnesota in 1972-73. In addition, one member of our staff taught the program in a cooperating classroom. Using the same feedback techniques as in 1971-72, data were collected for further revisions for the 1973-74 school year, when a final tryout was done. In parallel with the 1973-74 tryout, specifications for the commercial version were drafted for Encyclopaedia Britannica Educational Corporation, which had been awarded the contract for commercial production and dissemination. During the 1974-75 school year different staff-training techniques were tested in about 65 classrooms in 7 different states from New England to California, using the commercial version of the program.

By the end of the 1974-75 school year almost 7,000 children will have participated in one way or another in the development of the program. More than 1,200 hours will have been spent in discussing program characteristics with pilot- and field-test teachers, and more than 1,000 mail questionnaires will have been returned in their stamped and self-addressed envelopes.

What was most evident throughout this work was the number of decisions that had to be made for which supporting data were not obtainable within our budget and time lines. These decisions ranged from the amount of review required for skill maintenance following mastery to the placement of the component number on a practice sheet Most of these matters were resolved through trail and error, but this is a luxury which few programs can afford.

IV

EVALUATION

Several types of evaluation studies have been carried out during program development and are reported in Wisconsin Research and Development Technical Reports (Venezky et al., 1971; Kamm, Zajano, Hubbard, & Pittelman, 1974). More recent studies have examined the effectiveness of the program in teaching the program objectives, retention of skills from end of kindergarten to beginning of grade one, and relationship of prereading skill mastery to standardized reading readiness scores. The results of these studies (Venezky, in press), while giving justification to the prereading skill approach and to the program itself, are based upon field-test versions and are too limited in scope to represent a definitive statement of program effectiveness. There are, furthermore, evaluation issues which need to be resolved before an adequate evaluation of this (or any other) program can be made. Although a full discussion of these is not appropriate here, a brief sampling should be sufficient to give a flavoring of the problems involved.

1. The objective of any prereading program is to improve reading achievement. However, to assess reading ability at the end of, for example, grade one as a measure of effectiveness for a kindergarten program is to confuse program goals with the assumptions upon which the program is based. Program goals relate to those things for which the program provides instruction: prereading skills, attitudes, etc. The assumption upon which such programs are constructed is that mastery of certain skills will lead to success in learning to read. Consequently, separate evaluations must be made of the assumptions upon which a program is based and of how well the program meets its immediate goals.
2. Improving the readiness of children for reading might lead to no significant increase in average reading scores in a class, but instead might allow the teacher to achieve a desired goal with less time, effort, and resources than were formerly required. These savings can then be applied to instruction in other subjects. It is conceivable, therefore, that a good prereading program might have a greater effect upon Grade 1 math scores than Grade 1 reading scores.
3. Teachers generally choose their reading programs six to eight months prior to the time they plan to use them. If, due to a prereading program, children come to first grade far more prepared for reading instruction than in former years, the teacher might not be ready to take advantage of the children's advanced preparation. Some

teachers will require considerable proof before they will be convinced that the children are in fact significantly different. Hence, there might be a lag of one to two years before the first grade reading program is adapted to the new entry level abilities.

4. Programs don't teach, teachers do. Therefore, the evaluation of a program must be an evaluation of what the program does for the teacher, and only indirectly what it does for the students. Implied here is an assessment of changes in teacher attitude, utilization of resources, and capabilities for diagnosis and instruction. A program is one of many resources which a teacher can utilize to reach a desired goal. It is not like a railroad engine that the engineer controls--today by push buttons--along a fixed course, according to a fixed time table; a program is more like the blades, creams, powders, and instruction which are provided for the training and use of barbers. We can improve the accouterments of the trade endlessly, but the end product will still result from the skill of the barber himself.

These are some, but not all of the problems involved in evaluating a prereading program. They are not insurmountable, but they require serious attention to the goals, resources, and procedures of instruction.

V

CONCLUSIONS

I have already indicated a number of areas which require further consideration in the study and instruction of prereading skills. Let me conclude by summarizing them briefly.

1. The justification for the prereading skills approach to reading readiness rests upon logic and upon a limited experimental base. Long-term learning effects need to be attended to and the viability of discovery techniques within an expanded time scale need to be explored. Short-term achievements may not lead to long-term learning; in fact, it is conceivable that short-term failure through one type of instruction may have a more positive long-term influence than short-term success through another.
2. A methodology for studying sustained learning in an instructional setting must be developed. Piaget (1965), borrowing from Claparere, has advocated a technique called "instructional pedagogy" for investigating learning in situ. This approach is based on the manipulation of specific components of an instructional program, with measurement of marginal gain or loss. Whether we pursue this suggestion, or some other, I see no escape from the necessity to develop experimental procedures which use the on-going classroom in place of the departmental laboratory.
3. Finally, evaluation of instructional programs requires a sober assessment of the influence of schooling. At present we have little capability for identifying and measuring the relative effects of physical resources, teachers, programs, and parentage on learning. Without knowing the contribution of each, we have no justification for using achievement scores for evaluating programs.

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